

Data Fusion to Estimate Vortex Location for Drag Reduction in Formation Flight

Completed Technology Project (2012 - 2013)



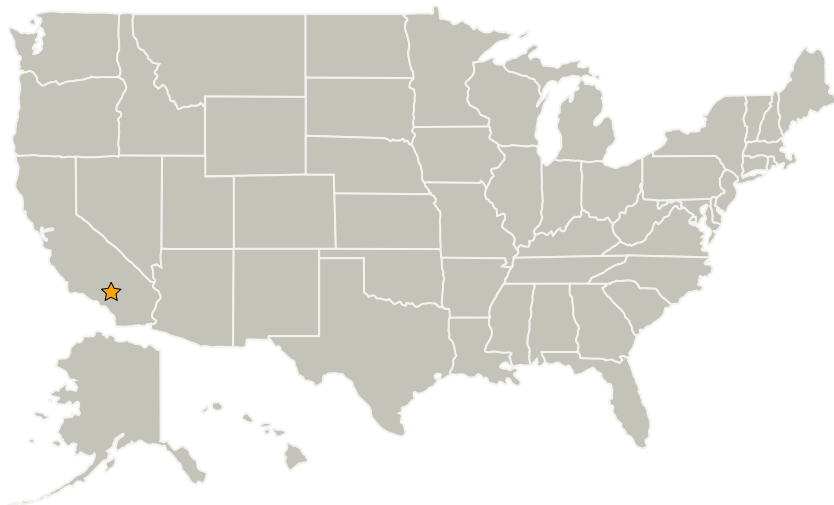
Project Introduction

NASA is investigating the potential benefits of flying aircraft in the aerodynamic wake vortex emanating from a lead aircraft's wing tip. Analytic studies predict that a trailing aircraft in the updraft portion of a wake vortex may experience drag reductions of 15 percent or more by gaining additional lift. One of the technical challenges is finding the optimal position within the vortex to fly. This Armstrong research project is evaluating a methodology that fuses data from existing sensors to estimate the optimal position. Work to date: A proof-of-concept simulation has demonstrated improvement in vortex estimation when combining data from the aircraft's moment and fuel flow sensors. Looking ahead: Near-term work involves building software to perform data fusion with real-time measurements. Longer-term goals are to evaluate the approach on an actual flight test and then a live demonstration of formation flight for drag reduction and fuel savings. Benefits Improves accuracy: In simulations, data fusion of moment and fuel flow sensors more accurately estimate the vortex core than do data from the individual sensors. Increases efficiency: Improved accuracy will result in greater drag reduction and fuel savings. Applications Military formation flying Commercial formation flying Unmanned aerial vehicle swarming

Anticipated Benefits

N/A

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research Center (AFRC)

Responsible Program:

Center Innovation Fund: AFRC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

David F Voracek

Project Manager:

John J Ryan

Principal Investigator:

John J Ryan

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Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.1 Aerodynamics